

Remarks

The Office Action dated September 20, 2007 has been carefully considered. Favorable reconsideration of the application is requested.

Claims 1, 2, 3, 9, 11, 12, and 14 have been amended. Claims 18 and 19 are new claims. No new matter has been added to the claims.

Priority

The Office Action acknowledges applicants' claim for foreign priority based on German application No. DE 102 31 356.3 filed on July 11, 2002. Attached hereto as Appendix A is a copy of the certified copy of the foreign priority document that is of record for International Application No. PCT/EP2003/007425 obtained from the WIPO site and which should have been provided to the U.S. Receiving Office by the International Bureau.

Claim Rejections

In the Office Action, claims 1, 3, 5, 6, 8-10, 12-14, 16, and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by WO00/52087 to Hähnle et al. This rejection is respectfully traversed for the reasons set forth below.

Hähnle et al. fails to disclose each and every element of claims 1, 3, 5, 6, 8-10, 12-14, 16, and 17.

Claim 1 of the present application is directed to a process for the preparation of water-absorbent, foam-type polymer structures, wherein an aqueous composition (A) comprising (A1) water, (A2) one or more polymers, (A3) crosslinker, (A4) one or more blowing agents, (A5) one or more surfactants, and (A6) optionally further auxiliary substances, is foamed, and the foamed

aqueous composition is then heated at a temperature in a range of from about 50 to about 300°C, so that the polymer (A2) crosslinks at least partially, and the content of the water (A1) is adjusted to not more than about 15wt%, based on the total weight of the foam-type polymer structure that forms.

Hähnle et al. on the other hand, discloses polymers obtainable by (1) foaming a polymerizable aqueous mixture comprising monoethylenically unsaturated monomers and crosslinkers, whereby the foaming takes place by dissolving a gas under a pressure of 2-400 bar in the polymerizable aqueous mixture and then decompressing this mixture to atmospheric pressure, and (2) polymerizing the foamed mixture (Hähnle et al. claim 1). Monomers are described in Hähnle et al. in col. 4, line 50 to col. 5, line 7, whereby preferred monomers include acrylic acid, methacrylic acid, vinylsulfonic acid, acrylamidopropanesulfonic acid, or mixtures thereof. Hähnle et al. discloses an aqueous composition comprising monomers that are foamed, and the foamed mixture is polymerized. Hähnle et al. fails to disclose an aqueous composition comprising a polymer wherein the aqueous composition is foamed. Hähnle et al. fails to disclose polymers being present in the polymerizable aqueous mixture as set forth in claim 1. Hence, Hähnle et al. does not disclose polymerization of a foamed solution of a monomer in the presence of a crosslinker, and not, as set forth in claim 1, a foaming and crosslinking of an aqueous composition containing one or more polymers. Accordingly, for this reason alone, Hähnle et al. does not disclose the process according to claim 1 of the present invention and claims 2, 3, 4, 5, and 19 that are dependent on claim 1.

Claim 5 of the present application is directed to a water-absorbent, foam-type polymer structure obtainable by the process according to claim 1. A polymer that is obtained by foaming

a solution comprising a monomer and crosslinker, and subsequent polymerization, as taught in Hähnle et al., is not the same as a polymer structure that is obtained by foaming an aqueous composition comprising a polymer in the presence of a crosslinker and subsequent thermal crosslinking, as set forth in the claim 5 of the present application.

Claim 8 of the present application is directed to a composite comprising a water-absorbent, foam-type polymer structure according to claim 5 and a substrate. Since Hähnle et al. fails to disclose the polymer structure according to claim 5 for the reasons set forth above, then Hähnle et al. cannot disclose a composite comprising a water-absorbent, foam-type polymer structure according to claim 5. Hence, the composite of claim 8, which is characterized in that it comprises the polymer structure of claim 5 is novel over Hähnle et al.

Claim 9 is directed to a process for the production of a composite according to claim 8. In the process according to current claim 9, the foamed aqueous composition according to claim 5, is brought into contact with at least a portion of the surface of a substrate and this combination is heated at a temperature in a range of from about 50 to about 300°C so that the polymer (A2) crosslinks at least partially. Hähnle et al. fails to disclose this process. Hähnle et al. discloses at column 13, lines 13-41, the foamed polymerizable aqueous mixture that comprises monomers is applied to a substrate and subsequently polymerized.

Claim 12 is directed to a further process for the production of a composite according to claim 8. In the process according to current claim 12, at least a portion of the surface of the water-absorbent, foam-type polymer structure is brought into contact with at least a portion of the substrate, and the polymer structure is then immobilized on at least a portion of the surface of the substrate. Hähnle et al. discloses at column 13, lines 13-41, the foamed polymerizable

aqueous mixture that comprises monomers is applied to a substrate and subsequently polymerized. Hähnle et al. fails to disclose bringing an already polymerized and crosslinked foam-type structure into contact with a substrate and subsequently immobilizing the polymer structure on the substrate. Claims 13 and 14 are dependent on claim 12.

In view of the foregoing remarks, it is requested that the rejection of claims 1, 3, 5, 6, 8-10, 12-14, 16, and 17 under 35 U.S.C. 102(b) as being anticipated by Hähnle et al. be withdrawn.

In the Office Action, claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO00/52087 to Hähnle et al. as applied to claim 1 above, and further in view of US 4,394,930 to Korpman. This rejection is respectfully traversed for the reasons set forth below.

Claim 2 is directed to the process of claim 1, wherein the polymer (A2) has a number-average molecular weight of at least 10,000g/mol. As set forth above, Hähnle et al. fails to disclose the process of claim 1. Korpman teaches an absorbent foam product prepared by mixing together a solid, particulate, water-insoluble, water-swellaable polymer having a gel capacity of at least 10, a solid, particulate blowing agent, and a liquid polyhydroxy organic compound and allowing the mixture to foam (claim 1 of Korpman). Water-insolubility is a necessary feature of the water-swellaable polymer of Korpman. While molecular weight is described as contributing to the water-insolubility, it is clear from the disclosure of Korpman that the crosslinking of the polymer is essential for water-insolubility(col 2 lines 21-27 and 29-32, and col. 4, line 35-43).

The polymer (A2) of the present invention, on the other hand is not crosslinked, in contrast to the polymer of Korpman. The crosslinking agent (A3) is present in the aqueous

composition comprising polymer (A2), and the polymer (A2) is first crosslinked after foaming the aqueous composition. Furthermore, the polymer (A2) of the present invention is not necessarily water-insoluble. Indeed, in a preferred embodiment, the polymer (A2) is water-soluble (page 14, lines 1-4 and examples 1-3 of the present application).

The combination of Hähnle et al. with the teaching of Korpman does not lead the skilled person to the present invention. First, regarding the question of molecular weight of the polymer in the aqueous composition as described in claim 2 of the present application, the skilled person would not combine Hähnle et al. with Korpman, since Hähnle et al. does not disclose a foaming of an aqueous composition comprising at least one polymer, but of an aqueous solution of a monomer. The molecular weights of the monomers as described in Hähnle et al. are easily available to the skilled person. As such the skilled person has no incentive to look to Korpman regarding molecular weight. Furthermore, both Hähnle et al. and Korpman teach away from the present invention in at least one point, since neither teaches, alone or in combination, a crosslinking of a foamed non-crosslinked polymer.

Accordingly, Korpman fails to overcome the failure of Hähnle et al. to disclose the present invention as set forth in claim 2. In view of this, it is requested that the rejection of claim 2 under 35 U.S.C. 103(a) as being unpatentable over Hähnle et al. as applied to claim 1 above, and further in view of Korpman be withdrawn.

In the Office Action, claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO00/52087 to Hähnle et al. as applied to claim 1 above, and further in view of US 6,001,911 to Ishizaki et al. This rejection is respectfully traversed for the reasons set forth below.

Claim 4 is directed to a process of claim 1, wherein the surface of the absorbent, foam-type polymer structure is smoothed in a further process step. Ishizaki et al. also does not disclose a process according to claim 1. Ishizaki et al. discloses a process analogous to the process disclosed in Hähnle et al., i.e., polymerizing a monomer in the presence of a crosslinking agent and a foaming agent (Ishizaki et al. col. 3, line 52-62; col. 8, lines 42-50 and examples 15 and 17). Accordingly, neither Hähnle et al. nor Ishizaki et al. alone or in combination with each other discloses or suggests a process set forth in claim 4. In view of this, it is requested that the rejection of claim 4 under 35 U.S.C. 103(a) as being unpatentable over Hähnle et al. as applied to claim 1 above, and further in view of Ishizaki et al. be withdrawn.

In the Office Action, claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO00/52087 to Hähnle et al. as applied to claims 1, 8, and 9 above, and further in view of US 6,033,769 to Bruggemann et al. This rejection is respectfully traversed for the reasons set forth below.

Claim 11 is directed to a process according to claim 9, wherein templates are used during application of the foamed , aqueous composition to the substrate.

Bruggemann et al. discloses a layered absorbing body for water or aqueous solutions, comprising at least two components A and B wherein component A is at least one particulate superabsorbent polymer or copolymer and component B is a matrix of at least one foamed water-soluble polymer or copolymer (Bruggemann et al., claim 1, claim 6, col. 3, lines 7-18). The layered absorbing body is prepared by a process with steps of a) spreading a foam of water-insoluble polymer component B in a sheet-like fashion, and b) applying the superabsorbent particulate polymerizate component A to the sheet-like foam, whereby step b) optionally occurs

using a template and finally heat treating (Bruggemann et al., col. 3, lines 32-53). The particulate superabsorbent polymer component A of Bruggemann et al. is not provided in the form of an aqueous composition, but in the form of solid particles. Even if the foamed water-insoluble polymer component B of Bruggemann et al. were considered – incorrectly – as the foamed composition of the present invention, the optional template in Bruggemann et al. is only referred to in connection with step b) sprinkling the solid, particulate component A (Bruggemann et al., example 1-12), and not in connection with step a) spreading a foam of water-insoluble polymer component B in a sheet-like fashion.

In addition, there is no suggestion in Bruggemann et al. of a crosslinking of the water-insoluble polymer component B, nor that this polymer might even become water absorbent. Rather, the water-insoluble polymer component B acts as a matrix for carrying the particulate, superabsorbent component A, whereby the matrix dissolves on contact with water or aqueous liquid, so that the absorbent properties of the superabsorbent component A are not blocked as a result of its being incorporated into the matrix component B (Bruggemann et al., col. 2, lines 52-67, and col. 3, lines 19-24). Since it is desired that the water-soluble polymer of Bruggemann et al. remains water-soluble, in order to fulfill its function as a water-soluble matrix for carrying a superabsorbent polymer, Bruggemann et al. clearly teaches away from the present invention as set forth in claim 11.

In view of this, it is requested that the rejection of claim 11 under 35 U.S.C. 103(a) as being unpatentable over Hähnle et al. as applied to claim 1, 8, and 9 above, and further in view of Bruggemann et al. be withdrawn.

Conclusion

In light of the amendments and remarks presented herein, Applicants submit that the present application is in condition for allowance, and such action is respectfully requested. If, however, any issues remain unresolved, the Examiner is invited to telephone Applicant's counsel at the number provided below.

Respectfully submitted,

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